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Host range study of *Rhizoctonia aerial* blight of soybean

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Abstract
Soybean *Glycine max* (L.) Merrill is a protein rich oilseed crop, and an excellent source of protein, fat and oil. *In-vitro* an experiment was conducted to evaluate the host range of *Rhozoctonia solani* which causes aerial blight of soybean. 20 different crop and weed host were selected for this study. Among the selected crops groundnut, mung, urdbean, showed host susceptibility as well as weed quack grass, barnyard grass, burmuda grass, spider ward, nut grass were also showed host susceptibility, however cocks comb, phyllanthus, euphorbia spp, wild jute, wild lettuce, xanthium, ziziphus, eclipta, cocklebur and night shade did not showed host susceptibility against *Rhizoctonia solani.*

Keywords: oil seed, in-vitro, experiment, susceptibility, host, host range, *Rhizoctonia solani*

Introduction
Soybean is a native of Eastern Asia. Earlier, botanically it was known as "*Glycine ussuriensis* Regal and Maack." This wild species is supposed to be the ancestor of the presently cultivated *Glycine max* (L.). Botanically it is called as *Glycine hispida* Moench, under the international rule of botanical nomenclature it is called as *Glycine max* (L.) Merill. Soybean *Glycine max* (L.) Merrill is a protein rich oilseed crop, and an excellent source of protein, fat and oil. It is considered as a golden bean, miracle bean and wonder crop of the 20th century because of its characters and usage. It contains 40-42% protein and 20-22% edible oil on dry weight basis. In Chhattisgarh, soybean cultivation is being undertaken in an area, production and productivity is 1.520 lakh ha, 1.756 lac mt, 1155 kg per hac. Respectively (Anon, 2013) [2]. The major soybean growing districts are Rajnandgaon, Durg, Raipur and Kabirdham. The average productivity of Rajnandgaon is 1044 kg/ha (Anonymous, 2005). The main constraints for low productivity are non-availability of high yielding and disease resistance varieties to farmers. Soybean plant is known to suffer from many diseases such as *Rhizoctonia* aerial blight, anthracnose, rust, *Cercospora* leaf spot, target spot, bud blight, yellow mosaic and some non-parasitic diseases due to excesses and deficiencies of trace elements (Sinclair, 1982) [11]. The *R. solani* is cosmopolitan fungus with a very wide host range and attacks large number of crop plants and weeds (Ou, 1972). At one stage, it was claimed that there is a hardly any plant species, which cannot be infected by *R.solani* (Singh et al. 1999).In India, it was first reported from Pantnagar (Uttarakhand) in 1967 (Mukhopadhyay and Singh, 1984) [14]. *Rhizoctonia solani* also causes aerial blight on *Vigna mungo*, *V. radiata*, *Macrotyloma uniflorum*, *Phaseolus vulgaris*, groundnut and soybean (Srivastava and Gupta, 1989). Sharma and Tripathi (2001) worked on the host range of urd bean isolates of *R. solani* and found the wide host range belongs to family Leguminoceae, Solanacae, Brassicaceae, Malvaceae, Cucurbitaceae etc. Amongst the disease of soybean, aerial blight caused by *Rhizoctonia solani* is considered to be important ones in India and also for the Chhattisgarh. The symptoms of aerial blight of soybean caused by *R. solani*, as leaf and pod spots, leaf blight, defoliation, stem and petiole lesions, cob web like mycelium and sclerotia developed over infected leaves were described by Atkins lewis, (1954) [3]. Mukhopadhyay and Singh (1984) [14] reported that symptoms of the disease depend on varieties of soybean. They also reported that the brown spot found on petioles and stems. Necrotic brown spot also formed on green leaves or complete leaves may be blighted. Web like mycelium of the pathogen also seen on diseased parts and their adjoining area of leaves. Thapliyal and Dubey (1987) [23] reported that the pathogen produces two type of sclerotia viz micro and macro sclerotia both can infect six week old plants. The disease causing heavy losses in the yield particularly in warm and humid parts of the country (Rai *et al*. 2007) [18]. Yield losses exceed 35-60 per cent. The present investigation is carried out for the identification of host range study of *Rhizoctonia* aerial blight of soybean. Hence there is a need to collect information on the off season survival of *R. solani* in different ecosystem on different plant species.

Considering the above reason, the present study was under taken by using different crops and weed species.

Materials and Methods

In-vitro an experiment was conducted to know the host range of *Rhizoctonia solani.* In this experiment twenty different crops (groundnut, mungbean, urdbean) and weed host i.e quack. The leaves of selected crops and weeds were surface sterilized with 0.1 percent sodium hypochloride then three time washed with sterilized water. These sterilized leaves were inoculated grass, barnyard grass, cocklebur, wild chilli, burmuda grass, cocks comb, spider wart, nutgrass, phyllanthus, euphorbia sp., wild jute, ground cherry, wild lettuce, eclipta, ziziphus, black night shade were evaluated for host susceptibility under artificial inoculated condition. All crops and associated weed of soybean were collected from IGKV, Research Farm, and Raipur. Leaves of selected crop and weed were surface sterilized with 0.1% mercuric chloride for one minute followed by three washing with sterilized water. Thereafter, these leaves were placed in sterilized petriplates, and big size desiccator and inoculated the mycelium bits of test fungus on leaves then incubate sterilized petriplate at 27ºC ±. In a desiccators to maintain the humidity cotton ball was placed on the inoculated portion. After inoculation desiccators was sealed with the help of grease. The observations were recorded after 4 days of inoculation for growth of pathogen and it was identified on the basis of yellowing and browning, sclerotia formation, complete death in relation to host susceptibility or non-host

Results and Discussion

All the 20 host crop and weeds show host susceptibility against *Rhizoctonia solani*. some weed like cocks comb, phyllanthus, euphorbia spp, wild jute, wild lettuce, xanthium, ziziphus, eclipta, cocklebur and night shade did not show host susceptibility against *R. solani* but some crops like groundnut,mungbean, urdbean as well as weed quack grass, barnyard grass, burmuda grass, spider ward, nut grass show host susceptibility. (Table 1) After this we also conclude that how much time required to produce symptoms as yellowing and browning, sclerotia formation, and complete death of host crop due to *Rhizoctonia solani*. (Fig 1) The fungus was re-isolated from all the infected plant species and produced typical *R. solani* characters on PDA. This proves that weeds and plants serve as collateral hosts and helped in the spread of the disease in next season. Similar results obtained by the Sharma and Tripathi (2001) have also worked on the host range of urdbean isolates of *R. solani* and found the wide host range belonged to different families viz. Leguminosae, Solanaceae, Brassicaceae, Malvaceae and Cucurbitaceae. Tiwari (1993) also reported the host range of web blight fungus of rice bean was carried out and observed typical web blight symptom on plants belonging to family Leguminoseae and banded blight symptom on plants of family Gramineae and Cyperaceae).

This proves that weeds and plants serve as collateral hosts and helped in the spread of the disease in next season. Hence, keeping bunds clean of weeds will help in checking the disease spread from primary sources. So, it is better recommended that weeding at timely intervals during crop season and selection of non-suitable crop helps in minimizing the disease in the next crop season. This was supported by (Tsai, 1974; Singh and Saksena 1980 and Goswami *et al.*, 2010) [8]

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Table 1: Host range study of *rhizoctonia aerial* blight of soybean

Host	Botanical Name	Yellowing And Browning (days)	Sclerotia Formation (days)	Complete death (days)
Groundnut	*Arachis hypogea*	2	7	8
Mungbean	*Vigna radiata*	3	5	6
Urdbean	*Vigna mungo*	2	5	6
Wild chilli	*Melilotus indica*	No disease	-	-
Quack grass	*Agropyran ripense*	3	7	7
Barnyard grass	*Echinochola colonum*	2	4	5
Cocklebur	*Xanthium strumerium*	No disease	-	-
Burmuda grass	*Cynodon dactylon*	4	7	9
Cocks comb	*Cilosia argentia*	No disease	-	-
Spider wart	*Commelina benghalensis*	4	7	6
Nut grass	*Cyperus rotundas*	3	4	8
Niruri	*Phyllanthus niruri*	No disease	-	-
Pil pod sparj	*Euphorbia hirta*	No disease	-	-
Pil pod	*Euphorbia geniculata*	No disease	-	-
Wild jute	*Corcorus acutangulas*	No disease	-	-
Nightshade	*Solanum suratense*	No disease	-	-
Felse desi	*Eclipta alba*	No disease	-	-
Ziziphus	*Ziziphus routandifolia*	No disease	-	-
Ground cherry	*Physelis minima*	No disease	-	-
Wild lettuce	*Lectuca virosa*	No disease	-	-

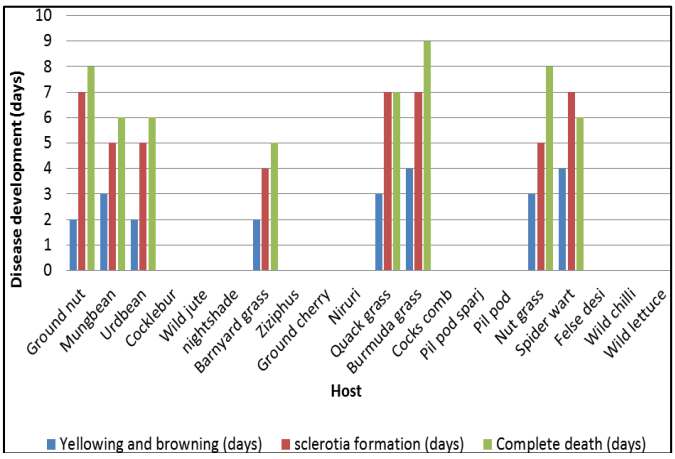

Fig 1: Host range study of *Rhizoctonia* aerial blight of soybean

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